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☞NOTICE TO READERS.☜

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THE AMERICAN
JOURNAL OF PHARMACY.

SEPTEMBER, 1886.

EXAMINATIONS OF AMERICAN DRUGS.

(Abstracts from Theses.)

Xanthoxylum fraxineum, Willdenow.—Edward T. Moffit, Ph.G., examined this bark and found the air-dry powder to retain 8 per cent. of moisture and to yield 11·08 per cent. of ash, one-fifth of which was soluble in water, and three-fourths soluble in hydrochloric acid, a little silica being left undissolved. Treatment with benzin yielded 3·2 per cent. of greenish fixed oil mixed with a crystalline resin, the latter being doubtless identical with that previously observed by Lloyd (AMER. JOUR. PHAR., 1876, p. 226), and by Colton (*Ibid.*, 1880, p. 192). Ether now extracted from the powder 4·34 per cent. green acrid resin, and absolute alcohol gave 2·70 per cent. of extract, consisting of resin, a little sugar, tannin, coloring matter, precipitated by basic lead acetate, and an alkaloid which was isolated by adding ammonia, agitating with chloroform and evaporating the latter when yellowish crystals were left. These were soluble in alcohol and chloroform, insoluble in benzin, ether and benzol, had a slighly bitter taste, produced with nitric acid a yellow solution, with sulphuric acid a brown color changing to dark red, and precipitates with the following reagents: Potassio-mercuric iodide white flocculent; auric chloride reddish-brown and red; platinic chloride brownish-yellow; picric acid yellowish; tannic acid grayish-yellow. The alkaloid is doubtless identical with that obtained by Colton (*Loc. cit.*, p. 193) from Xan. carolinianum, but this is stated to be insoluble in chloroform.

Further treatment of the powder showed the presence of sugar, gum, bitter extractive and albuminoids, and the absence of starch.

Kalmia angustifolia, Lin.—This small shrub is known as dwarf-laurel or lambkill, and is reputed to be poisonous to sheep. Thos. I. Deibert, Ph.G., collected several pounds of the leaves which on drying by exposure to the air lost 64 per cent. in weight; the loss of air dried leaves at an elevated temperature was 10 per cent. They were

coarsely powdered, boiled with water, the decoction precipitated with basic lead acetate, the filtrate treated with H_2S, again filtered and evaporated; the soft extract was treated with alcohol, and the filtrate on evaporation yielded an extract like mass in which minute crystals could be seen with a magnifying glass, and which, dissolved in water, yielded with ammonia and phosphomolybdic acid a beautiful blue color. The mass probably contained arbutin.

Exhausted with benzin the leaves yielded a soft sticky extract, containing wax, resin and fixed oil; it did not give a blue color with ammonia and phosphomolybdic acid. The leaves, previously treated with benzin, gave an alcoholic tincture containing considerable tannin, and subsequently yielded an infusion in which gummy matters were present. The air-dry leaves yielded 3½ per cent of ash.

Plantago major, Lin.—The leaves of this plant were examined by David Rosenbaum. Petroleum benzin extracted 4 per cent. of wax and chlorophyll, the extract fusing at 83° C. Ether dissolved 4·4 per cent. of resin and chlorophyll. The alcohol extract weighed 10 per cent., 6 per cent. being soluble in water, this portion containing considerable sugar; the remaining 4 parts were dissolved by ammonia. The soluble matter taken up by water weighed 13 per cent., 7·2 of which was insoluble in 66 per cent. alcohol. Soda solution dissolved 6 per cent., and diluted acid 10 per cent., the latter containing a notable quantity of calcium oxalate. The bleached lignin weighed 35.5 per cent. The powdered leaves contained 8 per cent. of moisture and yielded 12·85 per cent. of ash, 2·85 of which was soluble in water and 9·50 soluble in hydrochloric acid. Tannin, saponin, alkaloid, etc., were not found.

It will be of interest to mention in connection with the above the results obtained by Th. Koller, in 1868 (*N. Jahrb. d. Phar.*, xxx, 139), with the leaves of Plantago major, lanceolata and media; he found them to contain chlorophyll, resin, wax, albumin, pectin, citric acid and oxalic acid.

Hamamelis virginica, Lin.—Witchhazel bark has been subjected to analysis by Walter B. Cheney, Ph.G., with the following results: The yield of ash was 6·16 per cent, and it consisted of sulphate, chloride, phosphate and carbonate of potassium, sodium and magnesium, manganese and silica. The air-dry powder contained 9·75 per cent. of moisture and yielded 1·15 per cent. of benzin extract, which was also soluble in ether, absolute alcohol, benzol, chloroform and oil of tur-

pentine, and consisted mainly of wax saponifiable by alcoholic solution of soda. The powdered bark now gave with ether 7·65 per cent. of hard greenish extract of which nearly two-thirds was soluble in water, this portion containing tannin but no alkaloid or glucoside; the remaining resin was soluble in alcohol. Absolute alcohol extracted from the remaining powder 6·4 per cent. of soluble matter, fully two-thirds of which was soluble in water, and the remainder in ammonia; tannin and a little sugar were found to be present, but no indication of the presence of an alkaloid or other crystalline principle was obtained. The watery extract amounted to 5·74 per cent., of which 1·2 per cent. was glucose, besides mucilage and other principles. Soda solution extracted 1·75 per cent., including ·25 per cent. of albuminoids, and dilute acid took up 4 per cent., leaving half its weight of ash. The bleached cellulose weighed 57·61 per cent. The total amount of sugar, determined by Fehling's solution, was 1·4 per cent., and the tannin, weighed as gelatin precipitate, was 6·75 per cent. The search for an alkaloid or glucoside gave negative results.

Smilax rotundifolia, Lin.—It has a creeping pale yellowish rhizome many feet long, about ¼ inch thick, with internodes 4 to 6 inches in length, the nodes considerably thickened and each marked by a prominent brownish triangular leaf scale, and beset with some fine light-colored rootlets; the rootlets are more numerous near the growing end and are of a brown color. The dried rhizome is brittle, has little or no odor and has a somewhat bitter and slightly acrid taste. Arthur H. Cohn, Ph.G., collected the rhizome for investigation, and obtained from the air-dry powder 2·3 per cent. of ash, and by treatment with benzin ·05 per cent. of wax; with ether ·5 per cent. of resin, and with alcohol 2·8 per cent. of extract, the latter probably containing a glucoside, as indicated by the reactions. More of this principle was shown to be in the aqueous infusion, but it was not isolated. The presence of gummy matter, sugar, pectin, starch, etc., was ascertained; also the absence of calcium oxalate.

Equisetum hyemale, Lin., is to some extent employed as a remedy in dropsical affections. Frank J. Young, Ph.G., has known it to be prescribed in infusion together with digitalis and potassium acetate; but from the results of his analysis comes to the conclusion that the effects of the medicine would have been the same if the equisetum had been omitted. The air-dry drug yielded 18·2 per cent. of ash, consisting mostly of silica. Petroleum benzin exhausted from the pow-

der 1·4 per cent of a brownish-green semi-liquid fixed oil, which was readily saponified and was soluble in ether, chloroform and carbon bisulphide. Ether now took up 5·33 per cent. of a green semi-solid resin, soluble in chloroform, benzol and absolute alcohol, and imparting to water or acidulated water a greenish color, but no decided taste. Alcohol dissolved from the residuary powder 1·60 per cent. of resinous extract, free from tannin, alkaloid and glucoside. The powder gave to water 4·84 per cent. of extract, of which 2·25 per cent. were shown to be sugar by Fehling's solution, and 0·60 per cent. of mucilaginous matter was left undissolved by alcohol of 66 per cent.

SALICYLIC ACID AND MONAD SALTS.

By R. Rother.

It is known that the solution of salicylic acid in water is enormously augmented by the presence of certain salts of the monad metals, and that the resulting solutions have the physiological effects of free salicylic acid. It was, however, shown that in these combinations the acid is not free in any sense, but that normal salicylates and acid monad salts are formed.

In consideration of these facts, the writer attempted the solution of benzoic and gallic acid on the same principle.

It was found that benzoic acid is entirely inert in this connection under the usual circumstances, but that it liberates some acetic acid from potassium acetate on heating their mixture.

Gallic acid is much more energetic but adversely so as it generates sparingly soluble monad gallates.

Trials were then made with salicylic acid and various other salts than those heretofore used in such cases. It was found to have no effect with sulphates and hypophosphites, but it readily decomposed tartrates, pyrophosphates and borates. There are doubtless many other such saline combinations producible in this manner, but no others were sought.

This peculiar reaction led to the question of its special chemical character and the subsisting interrelations of the products. Hence the writer examined acetates, citrates, tartrates, phosphates, pyrophosphates and borates.

POTASSIUM ACETATE AND SALICYLIC ACID.

The addition of acetic acid to a simply aqueous solution of a sali-

cylate causes the precipitation of crystalline salicylic acid in profusion. It is therefore apparently remarkable that a normal acetate as abundantly dissolves free salicylic acid. It seems furthermore doubly strange that one molecule of the acetate conditions the solution of one molecule of the acid. This solution is however but temporary as it gradually deposits a considerable proportion of free acid. When this liberated acid is reconverted into potassium salt and reunited with the remaining solution no subsequent separation occurs, not even in the presence of any amount of excess of acetic acid. This result shows that a certain proportion of potassium acetate is essential to keep all the salicylic acid in solution in the presence of acetic acid largely in excess. It was found that this is effected when three molecules of the acetate react upon two molecules of salicylic acid, that is, in the proportion of 294 parts of the first and 276 parts of the second. Since the commercial potassium acetate is always more or less damp and indefinite, it is better to employ instead, 300 parts of perfectly dry and well crystallized potassium bicarbonate neutralized with acetic acid aided by warmth. The expression for the reaction is written

$$3(KAc)+2(HSl)=2(KSl)+KAc(HAc)_2.$$

This makes it apparent that only enough acetic acid is displaced to generate one molecule of acid potassium acetate which then protects two molecules of the salicylate in the presence of more acetic acid. This solution, when moderately dilute, has a not unpleasant acidulous taste and hence widely different from the nauseous flavor of unmixed salicylate.

Pure potassium salicylate, when crystallized on a slide and viewed under the microscope, is seen to be in the form of stellate groups having a fine appearance in polarized light. When, however, crystallized in a similar manner from the acetate solution it is presented in a greatly improved shape, being especially elegant under the polariscope. It is best seen with a half inch objective. The rays constituting the star crystal emanate from a common center without intercrossing. The rays thicken towards their middle and then again attenuate. They have a rather irregular contour and in the finest samples appear slightly curved.

POTASSIUM CITRATE.

Salicylic acid is abundantly dissolved by potassium citrate. The somewhat dilute solution has an acidulous not disagreeable taste.

Three molecules, 414 parts of salicylic acid requires two molecules, 648 parts of the citrate for perfect and permanent solution. This indicates that only half of the potassic radicle is replaced as represented by the following equation:

$$2(K_3Ci)+3(HSl)=3(KSl)+K_2HCi+KH_2Ci.$$

The two resulting acid citrates, either separately or conjointly, form an amorphous mass which greatly interferes with the crystallization of the intermingled salicylate. It is however readily distinguishable under the micro-polariscope. When the dry residue is flooded with sufficient water the crystals are better seen along the margins of the liquid.

POTASSIUM TARTRATE.

Salicylic acid and normal potassium tartrate react upon each other molecule for molecule, that is, in the proportion of 138 parts of the first and 235 parts of the second, according to the following:

$$K_2T+HSl=KSl+KHT.$$

After filtering off the precipitated acid tartrate the salicylate is obtained in a practically pure solution. Evaporated on a slide, the salt crystallizes mixed with an occasional rhomb of the acid tartrate. On flooding the slide with water the tartrate remains and becomes very conspicuous. It also polarizes, but incomparably less florid than the salicylate.

ROCHELLE SALT.

One molecule or 282 parts of sodio-potassic tartrate reacts with one molecule or 138 parts of salicylic acid. The product consists practically of precipitated acid potassic tartrate and a solution of sodium salicylate. The result is expressed by the equation:

$$KNaT+HSl=NaSl+KHT.$$

The solution dried on a slide gives a crystalline residue which, under the microscope, is shown to have a feathery appearance. In the smaller crystals there is a decided tendency to radial grouping. When the residue is flooded with water a due proportion of rhombic cream of tartar crystals remain and an occasional short prismatic needle of acid sodium tartrate is seen. The sodium salicylate soon attaches itself to these again, and whilst completely covering them wholly confuses itself. The salicylate polarizes finely as also does the acid sodium tartrate, but in much smaller degree. A solution of pure sodium salicylate yields chiefly feathery crystals arranged in numerous concentric rings. In each ring system the crystals are all confined to rings, but

radiate uniformly from the common center of the system. The Pharmacopœia states that sodium salicylate occurs in small crystalline plates. This is entirely wrong as there is not the slightest tendency to plated formation. Under insufficient powers of the microscope the rounded groups have such an appearance, but higher powers resolve them as already stated.

The writer believes that the descriptive paragraphs of the Pharmacopœia are a most valuable feature. It is, however, the writer's opinion that ocular demonstration is worth pages of definitions never so vividly realistic. Much energy and valuable space was devoted to the voluminous but comparatively useless tables in the Pharmacopœia. But it does appear that it would be entirely consonant with the purposes of the code to institute the most appropriate means of elevating its standards. It therefore seems that a profusion of well executed representations would be an admirable, most simple and yet highly effective supplement to the official pharmacognosy. Such an element would raise the microscope in pharmacy into conspicuous prominence. Furthermore, this feature, if appropriately immanent, would largely tend to develop the close scrutiny, cleanliness and care so essential in the business of pharmacy. There is no reason why every drug store should not be equipped with an effective microscope. The money annually paid for senseless luxuries would purchase every pharmacist a very serviceable instrument of this kind.

SODIUM ACETATE.

Sodium acetate is more definite and less changeable than the potassic salt. It therefore offers better opportunities in arriving at more decided conclusions. Aside from this, the result is analogous to that with potassium acetate, and the reaction is precisely similar, as follows:

$$3(NaAc)+2(HSl)=2(NaSl)+NaAc(HAc)_2.$$

The solution evaporated on a slide yields large but coarse radial groups which do not improve under the microscope.

SODIUM CITRATE.

Normal sodium citrate reacts with salicylic acid on the same principle as the potassium salt. Since, in this case also, but half rather than two-thirds of the base is replaced, the writer employed disodic citrate with a view to elucidate the general reaction. In this instance

two molecules of the citrate reacted with one molecule of the salicylic acid, according to the following equation:

$$2(Na_2HCi)+HSl=NaSl+Na_2HCi+NaH_2Ci.$$

It will be seen the extra molecule of disodic citrate is apparently superfluous as it reappears intact in the second member of the equation. It is nevertheless somehow essential to the result, as all the salicylic acid can only be dissolved by the whole amount. The solution leaves elegant crystals on the slide, which are simply magnificent under the microscope. They must be viewed with very low powers, owing to their unusual size. They now closely resemble the potassium salicylate, as formed from the acetate. They also lack the ringed arrangement.

SODIUM PHOSPHATE.

Salicylic acid reacts on disodic phosphate molecule for molecule according to the following equation:

$$Na_2HPO_4+HSl=NaSl+NaH_2PO_4.$$

The solution yields a dry residue in which the salicylate does not appear to advantage. It does not possess a particularly agreeable taste.

SODIUM PYROPHOSPHATE.

One molecule or 446 parts of sodium pyrophosphate dissolves two molecules or 276 parts of salicylic acid, and the reaction is indicated as follows:

$$Na_4P_2O_7+2(HSl)=2(NaSl)+Na_2H_2P_2O_7.$$

The product gives rather better results under the microscope than the phosphate mixture. It also has a more pleasant taste.

SODIUM BORATE.

Two molecules or 276 parts of salicylic acid are dissolved by one molecule or 382 parts of sodium pyroborate as shown by the following equation;

$$Na_2B_4O_7+2(HSl)=2(NaSl)+H_2B_4O_7.$$

This result is rather remarkable. It differs from all the other cases in that the pyroboric acid is wholly replaced and thus set free. On evaporation, a pasty, transparent residue remains. Under the microscope no satisfactory view is obtained, as the salicylate is completely obscured by the amorphous and extremely soluble pyroboric acid. The solution has a very nauseous taste.

AMMONIUM CITRATE.

It is difficult to obtain a definite normal ammonium citrate, owing to the similar condition of the carbonates. Bicarbonate of ammonium gives the best result, but not wholly free from uncertainty. The result with salicylic acid is possibly analogous to that with the other monad citrates. The indications, however, point to the following reaction:

$$(NH_4)_3Ci + HSl = NH_4Sl + (NH_4)_2HCi.$$

The solution readily yields most splendid crystals of ammonium salicylate. They are so large and distinct that very low powers serve best to exhibit them. Their form is intermediate between that of the potassium salt, obtained from the acetate, and the sodium salt derived from the citrate. The solution has a palatable, sweetish acidulous taste.

All of these mixed salicylates crystallizing well are obtainable from either strong or weak solutions with equal ease. Those, however, crystallizing with difficulty, appear better from weak solutions. All the solutions are more or less tinted of a brown-yellow color. Those from the potassium tartrate and the borax have the deepest shade, whilst those from the sodium pyrophosphate and the ammonium citrate have the lightest.

The solutions resulting from borax and sodium phosphate are the most unpalatable, while those of ammonium citrate and Rochelle salt are the least so.

PRACTICAL NOTES FROM VARIOUS SOURCES.

By the Editor.

Testing of Potassium Iodide.—Dr. J. Mühe (*Phar. Centralh.*, 1885, p. 85) stated that pure potassium iodide is decomposed with the liberation of iodine by water containing carbonic acid gas, but Weppen and Lüders (*Ibid.*, p.129) obtained different results. On repeating the experiments, H. Beckurts and W. Freytag (*Ibid.*, p. 215–218) ascertained that a 5 per cent. solution of pure potassium iodide in previously boiled water is not decomposed by a stream of pure carbonic acid gas; but the liberation of free iodine was at once observed, if the solution was mixed with water, impregnated with carbonic acid gas and kept on hand for some time. The same carbonic acid water, deprived of most of the gas by prolonged exposure in a beaker, as well as distilled water which had been kept on hand for some time, at once

liberated iodine. The absence of nitrites and hydrogen peroxide had been previously ascertained. The authors explain this behavior by the gradual change of the CO_2 at first dissolved in the water, into H_2CO_3, and that the decomposition of the iodide is effected by hydrogen carbonate, but not by carbon dioxide. The importance of these observations in connection with the testing for nitrous acid by means of potassium iodide is obvious.

Chloride of iodine and bromide of iodine produce with starch paste a violet color, according to the observations of H. Beckurts and W. Freytag (*Phar. Centralh.*, 1886, p. 231); for if to the blue aqueous solution of iodine and starch, chlorine water or bromine water be carefully added, the blue color is changed to violet, and this is destroyed by an excess of the reagents named, the liquid becoming colorless or yellowish-red. If to a mixture of chlorine water or bromine water with starch solution, a solution of iodine be carefully added, a violet colored precipitate of iodine-chloride starch or iodine-bromide starch is produced, the color disappearing on the application of heat and reappearing again on cooling. The same violet color is produced on adding to potassium iodide a small quantity of chlorate or bromate, also starch solution and diluted sulphuric acid; the violet color often changes to blue, most likely through the decomposition of the iodine chloride with the liberated hydriodic acid, whereby hydrochloric acid and free iodine are produced.

Nitrates contaminated with Chlorate.—O. Schlickum observed that samples of saltpetre free from chloride, on being heated to fusion, would yield a solution causing a precipitate with silver nitrate. H. Beckurts (*Archiv d. Phar.*, April, 1886, p. 333) has made similar observations with both sodium and potassium nitrate, and attributes this reaction to the presence of minute quantities of chlorate or perchlorate. He found also that at least 0·25 per cent. of potassium chlorate must be added to pure potassium nitrate before the former can be detected by the decoloration of indigo solution in the presence of diluted sulphuric acid and a minute quantity of sulphurous acid; but after treating such mixtures with nascent hydrogen, the presence of chloride could be established.

Sal pepticus or Peptochloride of Sodium or Digestive Salt are names suggested by Dr. Prosser James (*Brit. Med. Jour.*, May 16) for a mixture of sodium chloride and pepsin, which has been found useful in cases of dyspepsia.

Brandy.—Ch. Ordonneau has found in 100 liters of pure brandy, prepared from wine and 25 years old, the following: Acetaldehyde 3, acetic ether 35, acetal 35, normal propyl alcohol 40, normal butyl alcohol 218·6, normal amyl alcohol 83·8, normal hexyl alcohol 0·6, normal heptyl alcohol 1·5, propionic, butyric and caprylic ethers 4, œnanthic ether about 4, and amine bases 4 gm.

Alcohol prepared from maize, beets or potatoes, contains isobutyl alcohol (but no normal butyl alcohol), propyl alcohol, amyl alcohol, pyridine, and probably collidine. No butyl alcohol is produced under the influence of beer-yeast (the globular form), while normal butyl alcohol is generated by wine-yeast (the elliptic form).—*Rep. Anal. Chem.*, 1886, p. 13.

Eau de Quinine is a mixture of rum 100 p., cologne spirit 10 p., castor oil 10 p., tincture of red cinchona 10 p., balsam of Peru 3 p., and water 50 parts.—*Südd. Apoth. Ztg.*

Solution of Caffeine for Hypodermic Injections.—Tanret recommends the following: Triturate caffeine 2·50 gm., with sodium benzoate 2·95 gm., add distilled water 10 ccm. and filter. Solution takes place very readily. The benzoate is preferable to the salicylate of sodium because the latter acquires a rose colored tint on coming in contact with mere traces of iron.—*Rép. de Phar.*, 1886, p. 119.

Menthiodol has been recommended in neuralgia. It is prepared by carefully heating 4 parts of menthol in a small glass or porcelain vessel, adding 1 part of finely powdered iodol, and triturating well until a homogeneous mass is produced, which is converted into cones or pencils of suitable size. Should the mass become too hard for certain purposes, it is remelted with the addition of a minute quantity of camphor.—*Rundschau, Prag*, 1886, p. 368.

Iodol Ointment is recommended by Trousseau (*L'Union Méd.*, May 22, 1886) to be made of iodol 2 gm. and soft paraffin 10 gm.

Iodol Lotion is prepared with iodol 3 gm., alcohol 32 gm. and glycerin 65 gm.

Tablets of Aconite are recommended by P. Vigier (*Gaz. Hebdom. Méd.*, April 16, 1886) as a convenient form for administering aconite, and to be made of tragacanth 0·5 gm., orange flower water 5·0 gm., sugar 50 gm. and tincture of aconite root (F. Cod.) 200 drops; to be divided into 100 tablets, of which five to ten may be taken in 24 hours. The French tincture of aconite root is precisely one-half the strength of that of the U. S. Pharmacopœia.

Linimentum Terebinthinæ was ordered by the British Pharmacopœia, 1867, to be made by triturating together soft soap 2 oz., camphor 1 oz., oil of turpentine 16 fluid ounces. The present Pharmacopœia orders the same quantities, but directs the soft soap to be first mixed with 2 fluid ounces of water. W. Baxter, Jr. (*Phar. Jour. and Trans.*, June 5, 1886), states that this mixture soon separates, the lower layer becoming a thick jelly, very difficult to shake up; but if the water is increased to 4 fluid ounces, a beautiful liquid white and permanent emulsion is obtained.

Anise Cones are made from spermaceti, wax and oil of anise, and are recommended against the bites of flies and other insects.

Indellible Ink.—Dissolve extract of logwood 240 gm. in sufficient distilled water, add yellow potassium chromate 15 gm., and chromate of copper 8 gm., evaporate to a thick consistence and mix with 15 gm. of varnish.—*Phar. Rundschau, Prag*, 1886, p. 3 5.

Antiseptic Paper has been introduced in the military hospital of Vincennes by Dr. Bedoin. Filtering or other absorbent paper is sterilized by heating it in a drying oven to 110° C., after which it is immersed in a solution of corrosive sublimate, boric acid, phenol or other antiseptic.

Antiseptic Mouth Wash.—Dr. Müller (*Deut. Med. Wochensch.*) recommends a solution made of thymol 0·25 gm., benzoic acid 3·00 gm., tincture of eucalyptus 15·00 gm. and water 750·00 gm., to be used as a wash to rinse the mouth after meals, and especially before going to bed. It will destroy bacteria and prevent caries of the teeth and foul breath.

Boric Acid has been found useful by Dr. A. D. Macgregor (*Brit. Med. Jour.*, July 10) in various diseased conditions of the mouth, and has been applied in the form of powder, confection and as a gargle combined with glycerin. A good antiseptic *tooth-powder* is made from boric acid 4, potassium chlorate 3, guaiacum resin 2, prepared chalk 6, and magnesium carbonate 33 parts.

Stannous Chloride may be used as a disinfectant, according to D. Abbott, instead of corrosive sublimate, because it is comparatively safe, does not corrode lead pipes, and is also cheap. A 1 per cent. solution kills spores after an exposure of two hours. It is considerably more active than zinc chloride, copper sulphate, zinc sulphate, and sulphate of iron. When intended to be kept for use, it should be mixed with an equal weight of ammonium chloride, which prevents the formation of the insoluble oxychloride of tin.—*Med. News*, Jan. 30, 1886.

GLEANINGS FROM FOREIGN JOURNALS.

By George H. Ochse, Ph.G.

Polishing Pomade.—The following formula is said to yield a good product: Oxalic acid 1 part, ferric oxide 25 parts, tripoli 20 parts, palm oil 60 parts, soft paraffin 4 parts.—*Rundschau*, 1886, p. 435.

A Cement which is not affected by boiling sulphuric acid is made by melting caoutchouc at a moderate heat and adding 3 per cent. of suet, stirring constantly, then adding a sufficient quantity of slaked lime to give it the consistency of soft dough; lastly 20 per cent. of red oxide of lead is added.—*Ibid.*, p. 435.

Syrup of Lactophosphate of Calcium and Iron.—According to Thyssen, syrup of lactophosphate of iron is first made as follows: Dissolve 5 parts of lactate of iron in 40 phosphoric acid, add simple syrup 160 parts, oleosaccharate of lemon 4 parts and simple syrup enough to make 1000 parts. To this syrup is added the syrup of lactophosphate of calcium made as follows: Calcium lactophosphate 3 parts, citric acid 1.2 parts, simple syrup to make 1200 parts; flavor with oil of lemon.—*Ibid.*, p. 517.

Billroth's Adhesive Iodoform Gauze is made by impregnating 200 meters of bleached organtin with the following solution: Glycerin 500 grams, colophony 1000 grams, alcohol 10 kilograms, iodoform, pulverized, 4 kilograms.—*Ibid.*, p. 405.

Bismuth Salicylate.—Solger recommends salicylate of bismuth very highly in chronic catarrh of the bowels, also in the diarrhœa in the last stages of tuberculosis. In reflex neurosis, due to chronic intestinal affections, impotency and epileptic imbecility, due to the same cause, Solger obtained excellent results from its use. It is best administered in cachets, and is given in doses of 0·6 gram repeated every 3 hours.—*Ibid.*, p. 405.

Two New Reactions for Morphine.—1. If 1 milligram of powdered morphine is intimately mixed with 8 drops of concentrated sulphuric acid and a small particle of arseniate of potassium, and the whole is heated in a capsule (agitating constantly) until acid vapors are evolved a beautiful blue-violet color is produced; by continuing the heat the color changes to a dark-brown red. If water is cautiously added, a reddish color turning green when more water is added results. If the liquid is shaken with chloroform, a beautiful violet color is produced, if shaken with ether, a violet red color, the bottom layer turning brown.

2. If morphine is rubbed up with about 8 drops of concentrated sulphuric acid and a drop of a solution of chlorate of potassium 1 : 50, a persistent grass-green coloration, having a pale rose-red margin, is produced.—*Ibid.*, p. 580.

Pepsin.—Podwissotzki calls attention to the fact that fresh mucous membranes show very little pepsin, but a large quantity of propepsin; consequently a much larger yield can be obtained from membranes which have been exposed to the air and prevented from decomposing. To extract the pepsin, diluted hydrochloric acid or glycerin acidulated with hydrochloric acid is recommended. Alcohol extracts a very small percentage, glycerin extracts the propepsin, which must be treated with hydrochloric acid at ordinary temperature for from 2 to 10 minutes to be converted into pepsin.—*Ibid.*, p. 578.

Similar observations were made by Selldén in 1873, by Béchamp and Gautier in 1882, and by others.

THE MANUFACTURE OF CERESIN FROM OZOKERITE.[1]

By E. Sauerlandt.

In the showcase of a Belgian manufacturer of candles, at the Antwerp Exhibition, was to be seen a fragment of waxlike substance labelled "Ozokerite or Vegetable Wax." This fact shows how little is known, even by those most nearly interested, of an industry which, dating back only about fifteen years, has attained an annual value of upwards of half a million pounds sterling. The ignorance is no doubt due, mainly, to the paucity of information that has been published respecting the industry and the raw material used in it.

The first attempt at bleaching mineral wax known to the author dates from 1870. The first industrial results were obtained by H. Sljhely, of Stockerau, near Vienna, Dr. Pilz, of Carlsbad, and J. F. Otto, of Frankfort-upon-Oder; ceresin was introduced into the market by these different houses in the course of 1872.

During the last ten years a number of processes for the purification of ozokerite have been proposed, very few of which have been practically successful. At the present time scarcely more than two processes are employed, both of which are based upon the employment of sulphuric acid. In the more important establishments where mineral wax is refined, the ozokerite is heated in contact with sulphuric acid to

[1] Abstract from a paper in the *Chemiker Zeitung*, 1886, pp. 21 and 38.

a temperature of 180° C., and even higher, by which means an almost complete decomposition of the sulphuric acid and carbonization of the substances separated by it is effected. In some smaller factories where the operations are conducted at a much lower temperature, the acid, charged with the impurities, collects at the bottom of the vessel as a black tarry mass that is easily separated.

In whatever way the operation is conducted, it is necessary first to free the crude ozokerite, as delivered from the melters of Borislaw in Eastern Galicia, from the small quantity of water that it always contains; for which purpose it is dried by heating it to 130° C., at which temperature the water is entirely driven off. The mineral wax requires to be heated very slowly to avoid sudden ebullition of the melted mass, through the superheating of the water, and small pieces of the crude wax are thrown into it whenever it threatens to rise. In some cases this heating is effected in the same boilers as the heating with sulphuric acid; in others a special vessel is used which allows of the deposit of mechanically mixed impurities at the bottom. The vessels for the preliminary boiling, which should be of a capacity sufficient for a day's product, are heated either over a bare fire or are jacketed and heated by steam. In the former case the apparatus takes the form of an alembic, consisting of a hemispherical boiler with dome and cooling worm, in which any vapor of the light oil given off during the melting is condensed. When the heating is effected by steam, the small quantities of hydrocarbon carried away with the steam do not necessitate any arrangement for condensation.

In carrying out the first-mentioned method of bleaching, where the temperature is raised to 180° C., the mixture of the ozokerite with the sulphuric acid is effected either by means of an iron or copper stirrer worked by hand or by a mechanical agitator. Although the latter arrangement would appear in principle to be much the more rational of the two, it is not the most used, even in the larger manufactories, in consequence of practical difficulties that have not yet been satisfactorily overcome. After the earth-wax has been freed from water it is placed in the acidifying vessel with a mixture of vitriol and fuming sulphuric acid in proportions corresponding to the quality required; it is then gradually heated with constant stirring to 180° C., at which temperature the sulphuric acid is almost completely driven off. After neutralization of the last traces of acid and partial decolorization, the mixture is allowed to stand. The tolerably clear

layer of ceresin that forms at the top is drawn off and filtered through paper; the residue is pressed, whilst still in a warm pasty condition, in hydraulic presses, the runnings being also filtered through paper. As a result of these operations only about two-thirds of the ceresin present in the ozokerite is obtained, the other third being retained in the press residue. This is now generally recovered by extraction, petroleum benzin being the solvent used in most factories, and only here and there carbon bisulphide. The ceresin extracted is freed from traces of the solvent by passing superheated steam through it and then filtered. The entire yield by this method of operating amounts to 70 to 75 parts of white, or 80 to 85 parts yellow ceresin from 100 parts of ozokerite used.

According to the second method of working the dehydrated ozokerite is introduced into the mixing vessel in the melted condition at the lowest possible temperature, and then mixed by means of a mechanical stirrer or a current of dry air with exactly the quantity of sulphuric acid required to effect the reaction. After standing the top layer of dark colored but clear ceresin is drawn off into another vessel, where it is neutralized and decolorized and then filtered: The black tarry residue is neutralized and submitted to distillation, the distillate consisting of paraffin and mineral oils. This method has many disadvantages and is not largely followed. Both methods are, indeed, defective, since it is known that crude ozokerite can be made to yield 90 to 92 per cent. of a white bleached product, instead of the 70 to 75 per cent. usually obtained in manufactories.

The filtered ceresin, if intended for yellow goods, is brought up to the right tint by means of gamboge, turmeric, dragon's blood, or one of the various aniline colors soluble in fats, and then poured into moulds to cool. The "half white" and "white" ceresin is stirred continually while cooling to prevent crystallization, and it is not until it has solidified to a pasty consistence that it is poured into the moulds. In this way a whiter appearance in reflected light is produced.

White ceresin is frequently mixed by the manufacturers with the lower-priced paraffin and the yellow ceresin with resin. The addition of paraffin cannot be detected either by chemical tests or determination of the specific gravity. It is, however, hardly to be deemed an adulteration since in some cases, as for illuminating purposes, its presence is advantageous. The addition of resin ought, however, to

be deemed an adulteration. For its determination the suspected ceresin should be dissolved in hot alcohol, and the mixture then cooled and filtered. The ceresin being almost insoluble in cold alcohol is removed, and any resin present will be found in the residue upon evaporation of the filtrate.—*Phar. Jour. and Trans.*, July 31, p. 90.

ON THE SAPONIFICATION-EQUIVALENTS OF FIXED OILS.

By Alfred H. Allen, F.I.C., F.C.S.

Read before the Society of Public Analysts, June, 1886.

The saponification-method of examining fatty oils, originally applied by Kœttstorfer to the examination of butter, has been employed by various chemists for differentiating other oils, and has proved one of the most valuable methods of analysis yet devised.

The practical value of the indications of Kœttstorfer's process largely depends on the accumulation of evidence as to the limits of variation of neutralizing powers exhibited by different samples of oil of the same kind, and hence I have been at some trouble to collect data on the subject. These data are given in the following table, which contains results obtained by Kœttstorfer (K), F. W. and A. F. Stoddart (S), L. Archbutt (LA); E. Valenta (V), R. Moore (M), Hübl (Hl), O. Hehner (H), W. H. Deering (D), the author (A), and others. In many instances the figures are the average or extreme results yielded by the examination of a large number of samples, the determinations made in my own laboratory numbering many hundreds. Still, a further experience will doubtless show that the limits stated in the table in many instances require modification.

The table gives, in most cases, the number of samples on which the figures are based, together with the percentage of caustic potash required for saponification, and the "saponification-equivalent" corresponding thereto. This last value is found by dividing the percentage of KHO required to saponify the oil into 5610. It represents the number of grammes of an oil which would be saponified by one liter of a normal solution of any alkali. In the case of the glycerides, the saponification-equivalent is one-third of the molecular weight, but in the case of monatomic ethers, like those which essentially constitute sperm oil and beeswax, the saponification-equivalent is identical with the molecular weight.

Nature of Oil.	Initial of Observer.	No. of Samples.	Percentage of KHO for Saponification.	Saponification Equivalent.
A. Oleins—				
Lard oil	S.	...	19·1 to 19·6	
Olive oil	K., S., V.	30	19·1 to 19·6	
Olive oil	LA.	40	18·93 to 19·26	
Almond oil (sweet)	V	12	19·47 to 19·61	285 to 296
Arachis oil	V., M.	2	19·3 to 19·66	
Tea oil	Davies.	1	19·55	
Sesamé oil	V., M., A.	3	19·00 to 19·24	
Cottonseed oil	S., D., V., M., A.	8	19·10 to 19·66	
B. Rape Oil Class—				
Colza and Rape oils	K., D., S.	8	17·08 to 17·90	
Rape oil	LA.	44	17·02 to 17·64	313 to 330
Mustardseed oil	V., A.	2	17·4 to 17·5	
Cabbageseed oil	Davies.	1	17·52	
C. Vegetable Drying Oils—				
Linseed oil	S., D., M., LA.	9	18·74 to 19·52	
Poppyseed oil	V., M.	2	19·28 to 19·46	
Hempseed oil	V.	1	19·31	286 to 300
Walnut oil	V.	1	19·60	
Nigerseed oil	S.	2	18·9 to 19·1	
D. Marine Oleins—				
Codliver oil	A., V.	2	18·51 to 21·32	
Menhaden oil	A.	1	19·20	
Pilchard oil	S.	...	18·6 to 18·75	
Seal oil	S., D.	4	18·9 to 19·6	250 to 303
Southern whale oil	D.	1	19·31	
Northern whale oil	S., A.	4	18·85 to 22.44	
Porpoise oil	A.	2	21·60 to 21·88	
E. Butter Class—				
Butter fat	K., V., M., A.	large	22·15 to 23·24	241 to 253
Cocoanut oil	V., M.	5	24·62 to 26·84	209 to 255
Palmnut oil	V.	1	22·00 to 24·76	
F. Stearins, &c.—				
Lard	K., V., A.	7	19·20 to 19·65	
Tallow	K., D.	9	19·32 to 19·80	
Dripping	K.	2	19·65 to 19·70	
Butterine	M., A.	large	19·35 to 19·65	277 to 294
Goose fat	V.	1	19·26	
Bone fat	V., LA.	2	19·09 to 19·71	
Palm oil	M., V.	3	19·63 to 20·25	
Cacao Butter	V.	1	19·98	
G. Fluid Waxes—				
Sperm oil	S., D., A.	10	12·34 to 14·74	380 to 454
Bottlenose oil	A., LA., D.	5	12·30 to 13·40	419 to 456
H. Solid Waxes—				
Spermaceti	H.	3	12·73 to 13·04	432 to 441
Beeswax	H., Hl., A.	large	9.2 to 9·7	.....
Carnauba wax	Hl., V., H., LA.	4	7·90 to 8·51	.....
Chinese wax	A.	1	6·5	.....
I. Unclassed—				
Shark-liver oil	A.	8	14·00 to 19·76	284 to 400
Wool fat (suint)	V.	1	17·00	330
Lanolin	A.	1	9·83	570·9
Olive-kernel oil	V.	1	18·85	298
Castor oil	S., D., A., V.	6	17·60 to 18·15	309 to 319
Japanese wood oil	Davies.	1	21·1	266
Japan wax	H., Hl., V., A.	8	21·01 to 22·25	252 to 267
Myrtle wax	D., A.	2	20·57 to 21·17	265 to 273
Blown rape oil	LA., A.	3	19·8 to 20·4	275 to 284
Colophony	H., A., D.	4	17·0 to 19·3	290 to 330

On inspecting the results recorded in the foregoing table, it appears that the oils of Group A, consisting of olein with comparatively little stearin or palmitin, neutralize appreciably equal quantities of potash, and that whether of animal (like lard oil) or vegetable origin (*e. g.*, olive and almond oils). On the other hand, the oils of Group B, all of which are derived from cruciferous plants, neutralize sensibly less alkali than those of Group A, a fact which is explained by the presence of a considerable proportion of brassic acid, or other higher homologues of oleic acid, in rape oil and its allies. In the case of the drying oils, the saponification-equivalents are not characteristic, but they point to the probability of linoleic acid having a higher atomic weight than that commonly attributed to it. This suggestion receives support from a variety of facts which have passed under my notice, and I hope to refer to it more at length on a future occasion. The marine animal oils, Group D, do not yield very characteristic results, except in contrast with the figures of Group G, the oils of which are not glycerides, but consist essentially of ethers of monatomic alcohols. Porpoise oil is remarkable for the notable proportion of valerin contained in it, and hence for its comparatively high neutralizing power. Valeric acid is also the characteristic volatile fatty acid of the butter from porpoise milk. The glyceride of valeric acid also exists to a considerable extent in whale oil, blackfish oil, and dolphin oil. Chevreul obtained from the last named oil as much as 20·9 per cent. of valeric acid.

Of the solid fats, those of Group E resemble porpoise oil in containing glycerides of lower fatty acids, and hence possess lower saponification-equivalents than the oils of Group F, which consist essentially of variable mixtures of palmitin, stearin, and olein. Japan wax also contains a notable proportion of lower fatty acids. A sample examined by Hehner's butter method gave 88·4 per cent. of insoluble acids and 8·4 per cent. of soluble acids, calculated as $C_8 H_{16} O_2$.

The saponification-equivalent of rape oil is very sensiby reduced by oxidation or "blowing," a fact which is probably due to the formation of lower fatty acids, but the changes produced in oils by oxidation much need further investigation by the aid of recent methods of analysis.—*The Analyst*, 1886, p. 145.

Caffeine in hypodermic injections of ½ or ¼ grain has been found by Dr. Castle (*Cinc. Lancet and Clinic*) to successfully relieve neuralgia.

SOAP AS A HYGIENIC MATERIAL.

By Oscar Liebreich, M.D.

The general conception has heretofore been that the secretion collecting on the surface of the skin, "die Hautschmiere," originates in the sweat and also in the sebaceous glands, and that the mixture of dried sweat and sebum covers the skin as "uncleanness." I have shown, however, in my investigation with lanolin that the secretion of cholesterin fat, hitherto unknown in the human organism, takes place direct from the tissues containing keratin. The epidermis and also the epidermis of the hair can directly secrete fatty material. According to the earlier views, it was assumed that no formation of fat took place in the epidermis. One imagined the keratin structures, epidermis, hair, nails as properly only consisting of resisting keratin. We now know that to the tissue itself fat comes which is not prepared by the glands, but which is formed within the tissue itself. That under pathological conditions an excessive secretion of the sebaceous glands takes place has been proved by Dr. Lassar.

The secretion may, moreover, attain very considerable dimensions —*e. g.*, in the case of wool. In the spines of the hedge-hog the epidermis excretes a considerable quantity of fat, whilst the sebaceous follicles belonging to them are starved.

How large the amount of fatty contents of the horny tissues may be up to the present nothing definite is known. Apparently there may be great oscillations. But the important point in respect of hygiene is the fact that cholesterin or some analogous fat is always present in the horny tissues, although often in small quantities.

In the question of cleansing of the skin in a hygienic sense, the above described condition of the skin is to me naturally of the greatest significance. The skin should undergo cleansing without the chemical, and still more the physiological, properties suffering any change thereby. The skin should remain intact. If it were simply a matter of cleansing a keratin covering of the products that are deposited on it, the use of rather sharp cleansing material would not so much matter; the surface might be slightly cauterized without injury to the lower layers. But if we make use of sharp material the fat is withdrawn from the horny tissue of the hair, the epidermis; the epidermis is destroyed—at any rate, rendered more absorbent; and the lower layers, the stratum lucidum and granulosum, and farther in the cells, are given up to destructive action.

I believe no better example can be given how carefully and delicately the surface only of the horny tissue must be cleansed than to call to mind the processes that are gone through in a wool-cleansing establishment. Here the wool is to be freed from the natural cholesterin fat. The aim of the cleansing is to remove the fat carefully from the hair without attacking the substance of the hair. Even with the employment of soda, one has to proceed with the utmost caution, as the wool is easily rendered brittle, the wool cannot then be spun.

In the process of washing, then, only that fat is to be removed that is on the surface of the wool hairs. Free alkali or other sharp chemical substances extract the fat from the keratin tissues, and without it the wool becomes brittle, and therefore unusable. If we keep this point in view from the very commencement, all extracting material are to be rejected, such as ether and sulphide of carbon, that indeed extract more fat, but which completely lixiviate the horny tissue.

The cleansing of the skin is to be considered in an exactly similar manner. We wish to remove the impurities that are deposited on the skin without attacking the epidermis, and above all the fat contained in the epidermis must not be removed. For this purpose, above all things, a neutral soap is required. There should be no question of dissolving the secretions present on the skin. Soap acts only as an emulsifying agent. It is an old experience that when tar has to be removed from the skin the tarry spot is to be rubbed with fat, because then the soap acts as a better emulsifyer on the tar.

Soap should be perfectly neutral, and free from foreign substances or "complementary" material. I would certainly reject the various kinds of soap in general use, as hygienic toilet articles; the only reliable kinds of neutral soap fit for toilet use are those manufactured in accordance with the method published in the *Berichte des Vereins für Gewerbfleiss*, Nov. 3, 1884, in which the impurities and excess of alkali are got rid of by a twice-repeated centrifugal process. For the purpose of securing an excess of fat in the soap, I recommend the addition of lanolin.—Abstract from *The Medical Press.*

Hydrochlorate of Caffeine has been observed by Dr. Terrier to possess an anæsthetic action almost identical with that of cocaine.—*Jour. de. méd. de Paris.*

DIASTATIC ACTION OF SALIVA.

By R. H. Chittenden and H. E. Smith.

For the purpose of testing the diastatic action of saliva quantitatively, a 1 or 2 per cent. solution of starch was exposed to the action of saliva at 40° C. for half an hour, and the reducing substances formed were in all cases calculated as dextrose by Allihn's (*Zeit. anal. Chem.* xxii, 248) method. The action of a ferment is not proportional to its amount until its solution is much diluted; when the dilution of the saliva is as 1 : 50 or 100, the diastatic action can be taken as a measure of the amounts of ferment present. The normal alkalinity of 15 samples of saliva reckoned in terms of sodium carbonate was 0·097 per cent. When this is neutralized with 0·2 per cent. hydrochloric acid, its diastatic action is much increased, especially when the dilution is 1 : 50 or 100; but the difference is still pronounced when the dilution reaches 1 : 2000. There appears, however, to be no proportional relation between natural variations of alkalinity and diastatic action, although the addition of sodium carbonate to neutral saliva retards and finally stops the action of ptyalin in proportion to the amount added; this occurring especially readily in more dilute solutions. This is not due to simple dilution, but to the thereby diminished percentage of proteïd matter, which in the less diluted saliva possibly combines with the carbonate; and such proteïd compounds have no effect on the ferment. Neutral peptone, on the contrary, has a distinctly stimulating effect on the activity of neutral saliva; and when proportionate amounts of peptone and sodium carbonate are added, the destructive action of the latter is prevented, an alkaline proteïd substance being probably formed. The influence of free acid and of acid proteïd on the activity of ptyalin is important, in view of the rapid passage of the salivary secretions into the stomach. That gastric juice does destroy ptyalin has been shown by Langley (*J. Physiol.*, iii); the present research was directed to determining quantitatively the particulars of such action; the tropæolin test being used for the detection of free acid. As a mean of eight determinations, 20 c.c. of neutralized saliva were found to contain proteïds capable of combining with 7·74 c.c. of 0·1 per cent. hydrochloric acid, a result showing on comparison with similar experiments with peptones, either that the combining power for acid of saliva proteïd and peptone is different, or that much acid is used up in reacting with

the alkaline phosphates present in saliva. When the proteïd matter present is saturated with acid, the saliva has greater diastatic power than when it is simply neutralized. Small percentages of acid peptone act similarly, but beyond a certain point (when the amount of combined acid is over 0·006 per cent.), acid proteïds retard and finally destroy the action of the ferment. A minute trace of free acid in dilute saliva still further increases diastatic activity, but 0·003 per cent. of free hydrochloric acid stops it.—*Jour. Chem. Soc.*, July, 1886, p. 638; *Chem. News*, vol. 53.

NATURE OF PAPAÏN AND ITS ACTION ON VEGETABLE PROTEÏD.

By S. H. C. Martin.

The ferment in papaw juice is associated with an albumose, and to the reactions previously stated by Wurtz, the following are added: the solution gives a biuret reaction, and it is precipitated from a neutral solution by sodium magnesium sulphate, the precipitate still being active. It is not precipitated by magnesium sulphate or sodium chloride alone, as globulins are. It is soluble in glycerol, and if precipitated from this solution by alcohol, the filtrate has no proteolytic power. The kind of albumose is one nearly akin to the protalbumose of Kühne and Chittenden, and is called *a*-phytalbumose. Papaw juice also contains a milk-curdling ferment.

The proteïds present in papaw juice were found to be as follows: 1. Globulin, resembling serum globulin in its most important properties. 2. Albumin. 3. *β*-Phytalbumose precipitated almost completely by heat, by saturation with neutral salts, but not by dialysis. It differs from the heteroalbumose of Kühne and Chittenden, by not being precipitated by dialysis, by copper sulphate or by mercuric chloride. 4. *a*-Phytalbumose; soluble in cold or boiling water; not precipitated by saturation with neutral salts, except in an acid solution. This is the vegetable peptone referred to by Vines (*J. Physiol.*, iii) as hemialbumose. It differs from the protalbumose of Kühne and Chittenden by its non-precipitation by sodium chloride or by copper sulphate. Both these albumoses give the biuret reaction. No peptones occur in the juice, but leucine and tyrosine are present.

By a series of digestion experiments carried out on each of these proteïds by papaïn in a neutral liquid, it was found that both the

globulin and albumin are changed into β-phytalbumose, and that this becomes a peptone-like substance, and forms leucine and tyrosine. The α-phytalbumose becomes a similar peptone-like substance, leucine and tyrosine being formed. This peptone-like substance resembles the deuteroalbumose of Kühne and Chittenden, except that a solution of it when rendered acid by acetic acid in the presence of sodium chloride does not become cloudy on warming. No true peptones are formed.

Probably digestion in the plant itself is very slow, as much more liquid was used in the experiments than is present in the juice. The albumose forms probably the circulating proteïd in the plant.—*Jour. Chem. Soc.*, July, 1886, p. 642; *Jour. Physiol.*, vi. 336–360.

FORMALDEHYDE AND ITS CONDENSATION.

By O. Loew.

Formaldehyde is conveniently prepared in the following way: A current of dry air is drawn as quickly as possible through a half liter flask, half filled with methyl alcohol, then through a hard glass tube 30 cm. long, containing a cylinder of coarse copper gauze 5 cm. long, and then successively through an empty flask (300–400 c.c. capacity), and two flasks half filled with water. That part of the tube containing the copper gauze is surrounded with brass gauze and gently heated. When the alcohol vapor reaches the copper, the latter glows more or less, according to the rate of the current of air passing over it. The operation requires no attention beyond keeping up the supply of alcohol, and may be left night and day. A 15–20 per cent. solution of aldehyde was obtained in this way.

In like manner, ethers, hydrocarbons and even bases can be converted into aldehydes.

Formose, $C_6H_{12}O_6$, is obtained by shaking a 3·5 to 4 per cent. solution of formaldehyde with an excess of milk of lime; after half an hour, the liquid is filtered, and nearly or quite saturated with lime. In 5 to 6 days, the odor of formaldehyde disappears, and a drop of the liquid shows a very great reducing power with Fehling's solution. The whole is then neutralized with oxalic acid, the filtrate evaporated to a syrup, mixed with an equal volume of strong alcohol and warmed for some hours, when the greater part of the calcium formate separates. The filtrate is evaporated at a moderate temperature to a thick

syrup, dissolved in alcohol and treated with ether, which precipitates the sugar as a tenacious mass. The crude product was purified by partial precipitation. When dried at 90°, it forms a gum-like mass, and could not be obtained in the crystalline form. It has an intensely sweet taste, like that of cane-sugar syrup, which it generally resembles in its behavior, as for instance towards phenylhydrazine. It is sparingly soluble in alcohol, insoluble in ether. When heated at 119–120°, it gives up the elements of water, and yields a compound of the formula $C_6H_{10}O_5$, having an intensely bitter taste. Formose gradually loses its reducing power for Fehling's solution, when digested with a 2 per cent. solution of sulphuric acid; warm strong hydrochloric acid decomposes it with formation of humous substances. It is more readily decomposed by alkalis than dextrose. It reduces an alkaline solution of potassium ferricyanide to ferrocyanide, and precipitates metals, such as gold, palladium, etc., from solutions of their salts. Like dextrose and levulose, it gives a red coloration when warmed with an alkaline picric acid solution; it also decolorizes a solution of sodium sulphindigotate in presence of sodium carbonate. Other color reactions are described. Formose is quickly acted on by bromine, yielding oxalic and trihydroxybutyric acids. The action of nitric acid and of nascent hydrogen was also tried, but without any very definite results.

Yeast was found to have no action on formose carefully freed from formic acid. When a 5 per cent. solution is kept for three weeks with 5 c.c. of hay water, 1 per cent. of peptone, precipitated calcium carbonate, and 0·1 per cent. of hydrogen dipotassium phosphate at the ordinary temperature, a small quantity of lactic and less succinic acid are formed. Mould spores act on formose with separation of a substance, which rotated polarized light 5° to the right.

Compounds of formose with *baryta, sodium chloride, etc.*, were prepared. The *phenyldrazine-compound*, $C_{18}H_{22}N_4O_3$, formed by the union of phenylhydrazine (2 mols.) and formose (1 mol.) with elimination of 3 mols. OH_2, is described. Formose resembles the glucoses and differs essentially from Carius' phenose (*Annalen*, cxxxvi, 324), which is possibly an aromatic compound.

The substance obtained by Butlerow by the addition of lime-water to a boiling solution of "trihydroxymethylene," and described by him as methylenitan with the provisional formula $C_7H_{14}O_6$, is also formed by the action of lime at 70–90° on formose; it is a mixture consist-

ing chiefly of the saccharin of formose, $C_6H_{10}O_5$, already prepared and described by Tollens in 1884.

The condensation of formaldehyde to a sugar nearly related to the glucoses affords fresh evidence in support of v. Baeyer's theory of assimilation in plants. Attempts have been made to show that formaldehyde is an intermediate product between carbonic anhydride and dextrose, but without any definite results. The author, therefore, intends to investigate the external effect of formaldehyde on plants, and to ascertain whether starch is produced. The paper concludes with further remarks on the relation of formaldehyde to vegetable physiology.—*Jour. Chem. Soc., July*, 1886, p. 609. *J. pr. Chem.*, 321–351.

TWO NEW TESTS FOR SUGAR.[1]

The two reactions about to be described are common to cane-sugar, milk-sugar, glucose, levulose, and maltose, and to the carbohydrates and glucosides capable of yielding glucose by the action of sulphuric acid. They do not, however, produce any result with inosite, mannite, or quercite.

1. From one-half to two cubic centimetres of the suspected liquid are treated with two drops of a fifteen or twenty per cent. alcoholic solution of alpha-naphthol, and the mixture is shaken. A slight turbidity results from the precipitation of a little naphthol; sulphuric acid is then added in quantity equal to or even double the volume of the fluid, and the whole is briskly shaken. In the presence of sugar a deep violet color is developed, and dilution with water throws down a violet-blue precipitate, soluble in alcohol and ether with a yellow color, or in caustic potash with a golden-yellow color. In order that the reaction may occur as described, the test must be made exactly as stated.

This test will permit the detection of 0·00001 per cent. of sugar, and, with the exception of vanillin, anethol, methyl salicylate, and a few similar substances, gives no reaction when sugar is not present. These substances, however, either produce the color with sulphuric acid alone, or the precipitate formed when the violet solution is di-

[1] From a communication to the "Kaiserliche Akademie der Wissenschaften," Vienna.

luted with water, differs totally in character from that formed in saccharine liquids. The limit of sensibility of Fehling's test is 0·0008 per cent., and that of Trommer's test is 0·0025 per cent.

2. If, instead of the alpha-naphthol in the preceding test, an alcoholic solution of thymol of similar concentration be employed, the remaining manipulations being the same as before, a deep red varying from cinnabar to carmine is produced; dilution with water brings the color to carmine, and after a time there separates a flocculent precipitate, which dissolves with a pale-yellow color in alcohol, ether, and caustic potash, but with a bright yellow in ammonia.

The delicacy of this reaction is about the same as of that with alpha-naphthol.

After many experiments had shown the trustworthiness of the results given by these tests, it was interesting, on account of their exceeding delicacy, to apply them to the solution of the disputed question whether normal human urine does or does not contain sugar. The results of the first attempts were so decided that the urine examined appeared to be diabetic. The urine of a number of perfectly healthy individuals was therefore examined, but with precisely the same results. The tests were made with alcoholic solutions of alpha-naphthol and thymol, exactly as has been described, and the extraordinary delicacy of the reactions can be better understood by the statement that normal urine diluted to from one hundred to three hundred times its volume with water still gives a recognizable reaction. When the urine is diluted to four hundred times its volume, the test shows no result.

In order that there might be no question as to sugar being the actual cause of the reaction, the following substances were examined and gave negative results with both alpha-naphthol and thymol: urea, creatine, xanthine, uric acid, allantoine, hippuric acid, succinic acid, phenol, pyrocatechin and indican.

These results fully confirm the opinion advanced by Brücke, and supported by many other observers, that normal urine constantly contains sugar.

These tests may be applied in two different manners in order to distinguish a normal from a diabetic urine.

1. A specimen of normal urine and of that to be tested are equally diluted with water to about one hundred times their volume; the same quantity of each is then tested just as has been described; if

the suspected urine give a deeper violet than the normal specimen, it may be considered as diabetic.

2. The urine under examination is diluted with water to from four to six hundred times its volume. Even in this enormous dilution diabetic urine will sharply respond to the reactions of the tests described, while normal urine would give no result when diluted to four hundred times its volume.

After carefully studying the various tests for sugar in urine, F. Penzoldt came to the conclusion that the fermentation test is worthy of the greatest confidence in doubtful cases. All experiments, however, seem to show that the two new tests are decidedly more certain than the fermentation test. They leave but one thing to desire: they do not enable a distinction to be made between glucose and levulose, and although the sugar found in urine will in nearly all cases be glucose, yet various instances have occurred in which levulose was detected also.—*Phila. Med. Times*, Aug. 7, 1886; *Monatshefte für Chemie.*

TROPICAL FRUITS.[1]

By D. Morris,
Assistant-Director, Royal Gardens, Kew.

Amongst objects of productive industry receiving attention at present in our colonial possessions, tropical fruits are at once the newest and most interesting of all. Many of these fruits are practically unknown in England in a fresh state, and hence before tropical fruits are largely consumed here, it is necessary to diffuse knowledge respecting them, and to render them as familiar to English home people as they are to their colonial friends.

At the present Exhibition, owing to the suggestion of the Council of the Royal Horticultural Society, fresh fruits are shown from nearly every part of the British Empire. Thanks to the Colonial Market established in connection with the Exhibition, oranges, lemons and grapes are shown from the Australian Colonies; oranges of several kinds from Natal, fresh cocoa-nuts from the west coast of Africa, pine-apples from Antigua, bananas from Jamaica, naseberries (*Achras sapota*), Avocado pears, papaws, bread-fruit and limes from British

[1] Abstract of a paper read at a Conference held at the Colonial and Indian Exhibition. Mr. W. T. Thiselton Dyer, F.R.S., C.M.G., in the chair. From the *Gardeners' Chronicle*, July 24.

Guiana; melons from Barbadoes, prickly pears and dates from British India, and most luscious pine-apples from Singapore.

Although not exclusively a tropical fruit, the orange is found and flourishes throughout the eastern and western Tropics. Taking this fruit as an example, it is remarkable what a large increase has taken place in the consumption of this fruit in the United Kingdom during the last fifteen years. In 1870, the number of oranges imported into the United Kingdom was 80,000,000. In 1885 this number had increased to 500,000,000, or at the rate of fourteen per head of population. Dates are consumed to the extent of 5000 tons per annum, while cocoa-nuts are imported by the shipload.

Being the nearest to England, as well as the most productive in the way of tropical fruits, the West Indian Islands naturally supply, and should supply, the English market more readily than any other. At the present day in the West Indian Islands the value of the fruit exported is nearly £400,000 per annum.

In Jamaica alone fruit is annually exported to the value of over a quarter of a million sterling—consisting chiefly of bananas, oranges, pine-apples and cocoa-nuts. The Bahamas export chiefly pine-apples, both fresh and canned, to the value of £50,000 per annum. Trinidad grows and exports chiefly cocoa-nuts. British Honduras, connected by a mail route with New Orleans, exports bananas, cocoa-nuts and plantains to the value of £15,000 per annum. Montserrat is chiefly interested in limes, and exports limes and lime-juice to the annual value of £11,000. Dominica exports limes, tamarinds and concentrated lime-juice to the value of £4000; while flat and sugary Antigua exports only pine-apples, but those, though small, of very superior quality. From their geographical position it is only natural to suppose that a large proportion of the fruit of the West Indian Islands finds its way to the United States and Canada, where there are nearly fifty millions of people, with all of whom fruit enters largely into their daily food.

The banana (*Musa sapientum*) is the chief fruit at present cultivated in the West Indies, and this fruit is the one which in the future will be more largely offered in the English market than any other. There are numerous varieties of this fruit under cultivation; the Martinique banana is found the most profitable to grow for export, although a smaller fruit, known as the fig banana, is more luscious and more highly esteemed locally as a dessert fruit. Jamaica exports bananas to

the value of nearly £200,000 per annum, and is capable of growing fully three times the quantity now exported without any diminution in the larger staples.

The pine-apple (*Ananas sativa*) is no doubt indigenous in Jamaica, where an inferior kind, known as the "Cowboy macca," is still found wild. The pine-apple is incorporated in the arms of Jamaica, and certainly nowhere, except perhaps at Pernambuco, can pine-apples of such size and delicacy be grown as in some parts of this island. Antigua is noted for its pine-apples; the pitch-lake pine of Trinidad has at least a local reputation; but the Bahamas export more pine-apples in the fresh and cured state than any other part of the world. The chief supply of pine-apples for the English market at present comes from Madeira, the Canary Islands and the Azores. Should the interesting experiments now being carried on by Messrs. Scrutton and Sons, who have fitted up one of their ships with a refrigerating chamber, be successful, we shall before long have large supplies of pine-apples direct from the West Indies, and at a very moderate cost.

The West Indian lime (*Citrus medica, var. acida*) is a fruit which is not much known in England. It is possibly little grown anywhere else except in the West Indies, where a large industry is arising in connection with the preparation of raw and concentrated lime-juice for the manufacture of citric acid.

The mango (*Mangifera indica*) is the "apple" of the Tropics, and is a most nutritious and wholesome food as well as a dessert fruit Originally an East Indian tree, the mango has become thoroughly naturalized in the West Indies, and is forming large groves in waste places in Jamaica, where negroes, horses, pigs and fowls feed upon the fruits for nearly four months of the year. The West has given to the East the Anona fruits, known as sour-sop (*A. muricata*), the custard apple (*A. reticulata*), sweet-sop (*A. squamosa*), and the cherimoyer (*A. Cherimolia*), but practically only the second and third appear to have become established in the new home. The guava fruits (*Psidium Guayava*) are very common everywhere, and utilized chiefly for making the well-known guava jelly, and for flavoring cordials and syrups. The litchi, rambutan and longan of the East Indies are co-related by the genip (*Melicocca bijuga*) of the West Indies, all of which belong to the Sapindaceæ. The fruit of the spine-armed *Zizyphus Jujuba*, allied to the "seductive sweet fruit," the lotus of the ancient Lotophagi, has become cosmopolitan in its distribution,

and will soon find its way to England from the West as well as from the East. The passion-fruits are amongst the most delicate and refreshing of tropical fruits, and some of them have been successfully introduced to England. The most common are the granadilla (*Passiflora quadrangularis*), the pomme d'or or water lemon (*P. laurifolia*), the sweet-cup (*P. edulis*) and the calabash sweet-cup (*P. maliformis*).

Of tropical fruits known generally as nuts, we have a long list, some of which are seldom seen in England. The cocoa-nut is too well known to need description. It is computed that over three million acres of land are under cultivation in cocoa-nuts in tropical countries, and the annual export value of nuts, oil, copra and coir is estimated at nearly two million and a quarter pounds sterling. The Brazil nut (*Bertholletia excelsa*) is obtained entirely from wild trees which are of immense size; and the same may be said of the Sapucaya nut (*Lecythis Sapucajo*), and the Souari or butter-nut (*Caryoca nuciferum*).

India is so badly off for fruit herself, that she is not likely to be able to export any to this country; but the wild apricot of the Himalayas, of the Punjaub and North West Provinces, is produced in such immense quantities, and so easily cured by simply drying in the sun, that it might be imported at a very low price. It is the *Prunus armeniaca* of botanists, known in India as the mish-mush or Moon of the Faithful. This latter appellation it has obtained from the fact that it is sometimes pressed out into sheets or "moons" and kept in that state until required for use. The delicious fruits of Singapore and the Malay peninsula, amongst which the mangosteen and the durian are the best known, are not likely to come direct from those countries. The former has, however, been fruited both in Trinidad and Jamaica, and large trees of the latter exist at these islands, as well as at Dominica, Grenada and St. Vincent. Hence, West Indian mangosteens and durians are objects not impossible to be seen in England during the next decade.—*Phar. Jour. and Trans.*, July, 31, p. 88.

Aniline.—Dr Govan, of Rockland County, stated at the New York Medical Association that he had used aniline oil for the purpose of producing local anæsthesia when laying open felons and performing other minor operations. There was absolutely no pain, even when cutting down to the bone, when the finger had first been dipped for a short time in the oil.—*Cinci. Lancet and Clinic*, June 26, 1886.

GLEANINGS IN MATERIA MEDICA.

By the Editor.

Cortex adstringens Brasiliensis is the bark of Stryphnodendron Barbatimao, *Martius*, one of the Brazilian mimoseæ. This bark, which had been kept for a prolonged period, was examined by V. Wilbuszewitcz (*Phar. Zeitsch. f. Russland*, 1886; reprint), who obtained comparatively much phlobaphene and little tannin, the latter being obtained by the process of J. Löwe, by precipitating with sodium chloride, redissolving in water and agitating with acetic acid. By dialysis a small quantity of gallic acid was obtained. The phlobaphene is readily soluble in ammoniacal water, nearly insoluble in cold water, and is not precipitated by gelatin. Three tannins, differing in composition, one of them being slightly soluble in cold water, were obtained; their reactions were similar: brown black with ferric salts; light brown with copper acetate; red brown with copper sulphate; yellow with lead acetate; blue green with ammonium vanadate; tartar emetic, no precipitate, etc. 1 gm. potassium permanpanate oxidized 1·329 gm. of one tannin, and 1·305 gm. of another variety. Decomposed with potassa, protocatechuic acid was obtained, but phloroglucin could not be observed. On heating with diluted sulphuric acid in a sealed tube, the tannin was decomposed, yielding phlobaphene, gallic acid and traces of ellagic acid, but no sugar.

Bablah is the fruit of Acacia Bambolah, *Roxburgh*, indigenous to India. V. Wilbuszewitcz (*Phar. Ztsch. Russl.*, 1886; reprint) estimated the tannin present with potassium permanganate, which indicated 12.1242 per cent., the amount agreeing nearly with the weight of the tannin isolated. One of the tannins was sparingly soluble in cold water. The reactions of the four varieties of tannin were similar: blue black with ferric salts; black green with ammonium vanadate; copper acetate brown; copper sulphate yellowish to brown; tartar emetic yellowish; acetate of lead yellowish, etc. Gallic acid was also obtained in notable quantities. For oxidation 1·20125 to 1·27127 gm. of the four varieties of tannin required 1 gm. of potassium permanganate. By decomposition with alkalies the tannins yielded protocatechuic acid, and by treatment with dilute sulphuric acid phlobaphene, ellagic acid and gallic acid were obtained.

Pastinaca sativa, Lin.—The fresh and dried root were analyzed by Jos. T. Bennett, who found volatile oil, traces of tannin, coloring mat-

ter, sugar, hard tasteless resin, soft resin (having a somewhat burning taste and soluble in petroleum benzin), and gum, but no starch; an alkaloid could not be detected. Several of the products administered to cats produced no symptoms of poisoning.

Prof. Power considers the wild-grown parsnip root to be not poisonous, and refers to communications from Dr. J. J. Brown, of Sheboygan, Wis., and Dr. Vasey, of Washington, D. C., in confirmation of this view. The popular belief that wild parsnip root is poisonous, may have originated from mistaking for it the roots of the cowparsnip, Heracleum lanatum, *Mich.*, water-parsnip (Sium), and other tall umbelliferous plants.—*Contributions Dep. Phar., Univ. Wis.*, 1886, p. 39–44.

The Leaves of Podophyllum peltatum, Lin., collected soon after flowering, have been analyzed by Benj. F. Carter (*Contrib. Dep. Phar., Univ. Wis*, 1886, p. 35–38), who determined the presence of acetic acid, coloring matter, probably a kind of tannin and uncrystallizable sugar. Alkaloids are absent. The resin amounted to 6 per cent., was greenish black of an oily appearance, soluble in alkalies and completely precipitated by acids, also freely soluble in alcohol, 90 per cent. soluble in ether, 86 per cent. in chloroform, 72 per cent. in carbon disulphide, 67 per cent. in benzol, and 40 per cent. in petroleum benzin; it also dissolves to a considerable extent in boiling water. Ether dissolves the soft resin, the hard resin remaining behind. Fused with potassa a very small amount of protocatechuic acid appears to be formed. The resin has a bitter taste and a very much milder action than that of the rhizome.

The leaves had been previously examined by T. J. Husband, Jr. (Am. Jour. Phar., 1869, p. 200), and by Dr. S. P. Duffield (*Proc. Am. Phar. Asso.*, 1868, p. 147); the latter did not obtain any resin from the leaves collected in May, and only ·03 per cent. of resin from leaves collected late in autumn.

Lupinus luteus, Lin.—Baeyer (*Landw. Versuchs-Stat.*, ix, 168, and xiv, 164) and Eichhorn (*Landw. Versuchs-Stat.*, ix, 275) have described briefly a dextrin-like substance, which they found in the seed of this plant. It is soluble in alcohol, dextrorotatory, and converted by mineral acids into sugar which reduces alkaline copper solution. E. Steiger (*Berichte*, 1876, pp. 827-830) has obtained it as a white, hygroscopic powder, soluble in water, insoluble in ether and absolute alcohol, and having the formula $C_6H_{10}O_5$. It is not changed

by diastase, and is oxidized by strong nitric acid to mucic acid. When heated with dilute sulphuric or hydrochloric acid, it yields galactose and no glucose. This carbohydrate very closely resembles galactin (or adopting Scheibler's nomenclature galactan), obtained by Müntz from the seed of the lucerne (*Medicago sativa*). The author, therefore, proposes to call it *β-galactan.*

Itshongwe is the name of a South African plant which, according to the *Natal Mercury* of June 29, 1886, is used by nearly all the Kafir tribes for various diseases, but more especially for the fevers of the country, and also to make dogs keen in hunting. About 18 months ago, M. Joscelyn Cooke, of Estcourt, isolated from the plant an alkaloid, which is stated to be soluble in water and potassa, insoluble in ether, and soluble in hydrochloric acid; this supposed hydrochlorate does not form a double salt with platinum chloride, and on heating its aqueous solution, produces a precipitate which is soluble in diluted alcohol. The substance may possibly be a glucoside. The plant has been sent to Europe for experimentation.

Piper methysticum, Forster.—Attention has been drawn to the anæsthetic effects of this root, observed by Dr. L. Lewin (see AMER. JOUR. PHAR., March, 1886, p. 138). The acrid resin, noticed by Cuzent in 1860, seems to have been separated by Lewin (*Berl. Klin. Woch.*, 1886, No. 1) into two resins, of which β-resin is greasy and of a reddish-brown color, appearing in mass almost black. This is less active than the *α*-resin, which is yellowish-brown, has the characteristic odor of the drug, is freely soluble in alcohol, and placed upon the tongue produces a burning sensation followed by local anæsthesia.

Products of Euphorbiæ.—W. T. Thiselton Dyer reports (*Phar. Jour. and Trans.*, April 17, 1886, p. 879) that cuttings of the poisonous *oro plant*, which is used in Sierra Leone for making hedges, have been received at the Royal Gardens, Kew. They undoubtedly belong to a species of Euphorbia, but in the absence of flowers the species is indeterminable. In the opinion of N. E. Brown it does not agree with any West African species preserved in the herbarium of the Royal Gardens.

Euphorbium, obtained from Euphorbia resinifera, *Berg*, is now used in the manufacture of a durable paint for metal work, to which it adheres with peculiar tenacity, and which it preserves from corrosion; hence its value for ships' bottoms. This has created a new demand for euphorbium, the collection of which in Morocco had almost

become an extinct industry. According to J. Medley Wood, curator of the Botanic Garden at D'Urban, Natal, it has also become an article of commerce in that colony.

A gum from Angola, probably also derived from a Euphorbia, may find a use in the manufacture of kamptulicon, a variety of floor-cloth.

Parthenium Hysterophorus, Lin.; Compositæ.—This tall annual, which grows as a weed in the West Indian Islands, the Bahamas and southward to Northern Patagonia, has recently attracted attention as a febrifuge. Dr. J. R. Tovar, of Havana, reported the successful treatment of neuralgia and of intermittent fever with an alkaloid *parthenine*, given in doses of 0·1 gm. Dr. Ulrici (*Deut. Med. Wochensch.*, Feb. 8, 1886) states that the plant is known in Cuba as *escoba amarga* or *confitilla*, and contains uncrystallizable *parthenic acid*, the crystallizable alkaloid *parthenine*, and four other alkaloids; parthenine is the active principle. Dr. Guyet (*Gaz. Méd.*, May 29, p. 259) states that parthenine is a complex substance, amorphous, in black shining scales, freely soluble in water, and is efficacious against neuralgia, but useless as an antipyretic.

The stem of the plant is 2 to 4 feet high, stiff-hairy, furrowed and branched; the leaves are alternate, bipinnatifid, with the lobes obtuse, and the petiole winged; the upper leaves are pinnatifid or entire; the flower heads are in spreading panicles, hemispherical, about $\frac{1}{8}$-inch broad; the akenes are compressed and have a pappus consisting of two oblong blunt scales. The entire plant is more or less covered with short hairs. It is known in Jamaica as *wild wormwood, white-head, mugwort* and *broombush.*

Asclepiadin has been prepared by C. Gram from Asclepias curassavica, Asclepias incarnata and Vincetoxicum officinale. This glucoside is easily decomposed on being boiled with acids, or on evaporating its neutral solutions on a water bath, or even on being kept in the dry state, sugar and brown-yellow resinous *asclepin* being produced, the latter of which is entirely insoluble in water. Both these principles are poisonous.—*Arch. d. Phar.*, May, 1886, p. 414; *Arch. f. exp. Pathol.*, xxiv.

This principle was first isolated from vincetoxicum by Feneulle (*Jour. Phar. Chim.*, July, 1825), and was obtained in a purer state by Harnack (*Arch. exp. Pathol.*, ii., 303) by treating the aqueous extract with ether and alcohol, in both of which liquids it is soluble,

likewise in water. It acquires a yellowish green and dark green color by strong hydrochloric acid, is oxidized to oxalic acid by nitric acid, and is precipitated by tannin and basic lead acetate.

TYROTOXICON; ITS PRESENCE IN POISONOUS ICE CREAM; ITS DEVELOPMENT IN MILK; AND ITS PROBABLE RELATION TO CHOLERA INFANTUM AND KINDRED DISEASES.

By Victor C. Vaughan, M. D., Ph. D.,

Prof. of Physiological Chemistry in the University of Mich., Member of the State Board of Health.

About one year ago, and after two years of close investigation, the writer succeeded in isolating from some samples of cheese, which had produced alarming symptoms in many persons, a highly poisonous ptomaine, to which the name tyrotoxicon (cheese poison) was given. The effects of this poison were demonstrated repeatedly upon some of my students, who kindly offered themselves as subjects of experimentation, and upon myself. These were found to agree closely with those observed by the physicians who treated the persons made sick by eating of the cheese. There were reported to the Michigan State Board of Health about 300 cases. The most prominent symptoms were dryness and constriction of the fauces, nausea, retching, vomiting and purging.

The vomited matter was frothy and the stools watery. In some there were evidences of marked nervous depression. Although in many the condition seemed alarming, all finally recovered.

A report of the discovery of tyrotoxicon in cheese will be found in *Zeitschrift für physiologische Chemie*, B. X, Heft 2; also in the Annual Report of the Michigan State Board of Health, for the year 1885.—See also Am. Jour. Pharm. July, 1886, p. 342.

Last November a student brought to me a four ounce bottle partly filled with milk which had stood tightly closed with a glass stopper for about six months. From this I succeeded in isolating the same poison. It was recognized by its crystalline appearance and by its effect upon myself. It was presumed that this milk was normal in composition when first obtained; but of this we could not be certain.

I then put several gallons of normal milk in perfectly clean bottles with glass stoppers and allowed these to stand in my work room. From time to time a bottle was opened and the test for tyrotoxicon

was made. These tests were followed by negative results, until about three months after the experiment was begun. I then succeeded in getting the poison from one of the bottles. The method of testing for it was as follows: The coagulated milk was filtered through heavy Swedish filter paper. The filtrate was colorless and decidedly acid in reaction. It was rendered feebly alkaline by the addition of potassium hydrate, then agitated with ether. After separation the ethereal layer was removed with a pipette, allowed to run through a dry filter paper to remove a flocculent, white substance which floated in it, and then allowed to evaporate spontaneously. If necessary this residue was dissolved in water and again extracted with ether. On the evaporation of the ether the tyrotoxicon was recognized by its crystalline appearance, by its odor, and by placing a small bit on the tongue. As the ether takes up some water, there is usually enough of the latter left after the spontaneous evaporation of the ether to hold the poison in solution, and in order to obtain the crystals this aqueous solution must be allowed to stand for some hours in vacuo over sulphuric acid.

From one half gallon of the milk there was obtained quite a concentrated aqueous solution of the poison after the spontaneous evaporation of the ether. Ten drops of this solution placed in the mouth of a small dog three weeks old caused, within a few minutes, frothing at the mouth, retching, the vomiting of frothy fluid, muscular spasm over the abdomen, and after some hours watery stools. The next day the dog seemed to have partially recovered, but was unable to retain any food. This condition continuing for two or three days, the animal was killed with chloroform. No examination of the stomach was made.

It may be remarked here that I have elsewhere pointed out the necessity of using pure ether for these extractions, as some samples of ether contain an irritating, ptomaine-like substance.

June 13, 1886, I received from Dr. Henry B. Baker, Secretary of the Michigan State Board of Health, a pint bottle about two-thirds full of melted ice cream, with the request that I analyze it, as some 18 persons had been seriously affected by eating of it. Dr. Baker also sent some of the vanilla which had been used as flavoring. It was thought that the poison would be found in the vanilla, because some lemon ice cream furnished at the same gathering had not affected those who ate it. As the readiest means of deciding this, my as-

sistant, Mr. Novie, and myself, took at first, 30 drops of the vanilla extract. No ill effects following this, Mr. Novie took two teaspoonfuls more, with no results. This settled the question of the poisonous nature of the vanilla more satisfactorily than could have been done by a chemical analysis.

We then added some distilled water to the cream and, after thorough agitation, filtered it. The filtrate was tested for tyrotoxicon by the method already given. The aqueous solution, after the spontaneous evaporation of the ether, was given to a cat. Within ten minutes the cat began to retch, and soon it vomited. This retching and vomiting continued for two hours, during which time the animal was under observation, and the next morning it was observed that it had passed several watery stools. After this, although the cat could walk about the room, it was unable to retain any food. Several times it was observed to lap a little milk, but on doing so it would immediately begin to retch and vomit. Even cold water produced this effect. This condition continuing, after three days the animal was placed under ether and its abdominal organs examined. We certainly expected to find marked inflammation of the stomach. But we really did find the stomach and small intestines filled with a frothy, serous fluid, such as had formed the vomited matter, and the mucous membrane very white and soft. There was not the slightest redness anywhere. The liver and other abdominal organs seemed to be normal.

It should be remarked that this cat was about two months old. Attention is called to this, because young animals are affected by this poison much more readily than older ones. It requires a comparatively large amount of the poison to cause any marked symptoms in an old cat.

After having made these experiments, I received from Dr. R. C. Moffitt, of Lawton, Mich., the following letter:

LAWTON, MICH., June 21, 1886.

DEAR DOCTOR:—I understand from Prof. Chas. Lawton, of this place, that the cream sent to Lansing, for examination, has been forwarded to you, so I write to give you the particulars. About two hours after eating the cream every one was taken with severe vomiting, and after from one to six hours later with purging. The vomit was of a soapy character, and the stools watery and frothy. There was some griping of the stomach and abdomen, with severe occipital headache, excruciating back-ache and 'bone' pains all over, especially marked in the extremities. The vomiting lasted from two t

three hours, then gradually subsided, and everybody felt stretchy, and yawned in spite of all resistance. The throats of all were œdematous. One or two were stupefied; others were cold and experienced some muscular spasms. A numb feeling, with dizziness and momentary loss of consciousness, was complained of by some. Temperature was normal, and pulse from 90 to 120. Tongue, dry and chapped. All were thirsty after the vomiting subsided, and called for cold water, which was allowed in small quantities, with no bad results. After getting out no one of the victims was able to be in the hot sun for several days, and even yet (about ten days after the poisioning) the heat affects myself. I attended twelve persons, besides being sick myself, and all were affected pretty much the same way. Several complain yet of inability to retain food on the stomach without distressing them. The man who made the cream took a teaspoonful of it, and he vomited the same as those who ate a whole dish, but not so often nor for so long a time. All are affected with an irresistible desire to sleep, which can scarcely be overcome. Even yet, some of us feel that drowsy condition, with occasional occipital headache.

Yours fraternally, "R. C. MOFFITT, M. D."

It will be seen from the above, that the symptoms produced in the persons agree closely with those observed in the cat. Cases of poisoning from ice cream are by no means rare, and I hope that those who have the opportunity will not fail to test for tyrotoxicon. In the report of the Brooklyn Board of Health for 1885, an instance is given of the poisoning of more than 100 persons from ice cream, sent out from one restaurant. The chemist was unable to detect any mineral poison. The injurious results were attributed to the use of decomposed gelatin; but no gelatin of any kind was used in the Lawton cream. Other cases occurring in New York and Brooklyn, have been attributed to the employment of artificially prepared vanillin for flavoring; but the vanilla extract used in the Lawton cream was not poisonous, as has been shown.

As I write this, I notice in the daily papers, the report of the fearful poisoning from ice cream, near Leamington, N. J. The papers state that the poisonous substance is arsenic, but how this has been determined is not given. I suppose that arsenic has been named from the symptoms. If it be true that the cream was made from milk brought in by the quart or gallon, by those participating in the festivities, the chance of mixing some milk containing the germ, which must produce the poison, with the good and thus contaminating the whole, was as favorable as it could well be. Of course, if a chemical analysis shows the presence of arsenic, the question is settled; but in all similar instances, chemical analysis has demonstrated the absence of mineral poisons.

The circumstances under which tyrotoxicon develops require farther study. As has been shown above, it may develop in normal milk kept in a clean bottle for three months; but it is evident that in some instances it appears much earlier. The production of the ptomaine is, in all probability, due either directly or indirectly, to the growth of some micro-organism. In the cheese, Dr. Sternberg found a new micrococcus; but whether or not there is any relation between this organism and the poison remains to be determined. In the cheese, milk and cream, in all of which I have found the poison, there was present more or less butyric acid, and it may be that there is some intimate relation between butyric acid fermentation and the production of the poison. Some years ago Selmi obtained a ptomaine which resembles coniine, and pointed out that it might be formed by the action of butyric acid on ammonia, thus:

$$\underset{\text{(Butyric Acid.)}}{2C_4H_8O_2} + \underset{\text{(Ammonia.)}}{NH_3} - 2H_2O = \underset{\text{(Coniine.)}}{C_8H_{15}N}.$$

or thus: $2C_4H_8O_2 + NH_2 + 2H - 4H_2O = C_8H_{15}N$.

In like manner other fatty acids may react with decomposing nitrogenous substances, forming alkaloidal bodies. Tyrotoxicon has no special resemblance, so far as is known, with coniine, but the possibility of these alkaloidal substances being formed in this way is worthy of mention. T. Lauder Brunton, in referring to the writer's discovery of tyrotoxicon, states that from the action of the substance he would infer the presence of two poisons. This is altogether possible. The writer has not been able to obtain the poison, as yet, in quantities sufficient to enable him to make an ultimate analysis of it. But that it is a chemical body produced by fermentation there can be no doubt.

If there be any doubt about the poison being produced by fermentation, the following experiment would seem to clear it up.

June 26, I took two samples, of one pint each, from a bottle of milk which had already undergone the lactic acid fermentation. These samples were placed in clean glass graduates. To one, a piece of the solid portion of the poisonous custard, about the size of a filbert, and which had been washed with distilled water, was added. To the other no addition was made. These samples stood side by side for forty-eight hours. Both were then tested for tyrotoxicon. The one to which no addition was made gave no crystals, no odor, and and when given to a cat produced no effect. The one to which the

addition had been made, yielded crystals which had the odor of tyrotoxicon, and which, when given to a very large old cat, produced frothing at the mouth and retching, but no vomiting or diarrhœa, and the next day the animal was able to eat food and seemed to have recovered. I am quite certain that had this been administered to a young animal, the result would have been more marked.

It is well known, that milk, while undergoing the lactic acid fermentation, does not possess any such poisonous properties as those belonging to tyrotoxicon. There is no evidence, then, that the poison is connected in any way with the ordinary decomposition of milk. The following extracts from a letter just received from the maker of Lawton cream shows that the attention given to the milk and vessels was all that could be desired:

"The milk of which the cream was made, was fresh and sweet morning's milk, only reserving with it the cream of the milk of the night before from the same cows. The milk is kept in a cool, clean milk cellar. The custard was made about noon that day and immediately afterward the process of freezing was begun. The vessels were all thoroughly cleaned. There was no possibility of any impurities adhering to them, for they were scalded, wiped and dried before being used. The only ingredients used were the milk, cream, eggs, sugar (best granulated) and the flavoring.

"The lemon cream was frozen first, then taken out, put into the packers, and packed solid with ice and salt. Then the vanilla cream was frozen in the same manner. I used the best Jenning's extract, about the usual quantity, not in excess. The cream was eaten in the evening by many people of the village. All of those who ate of the vanilla cream were made sick, and none of those who ate of the lemon cream suffered any inconvenience.

"Now, the milk was the same in both, milked from the same cows the same morning that the cream was made, so that there was no difference in the custard used in making the vanilla cream and the lemon cream, but it turned out that the one made people sick and the other did not.

"We have continued making cream since in the same manner without the least change of the ingredients or the apparatus, except we have not used vanilla extract, but lemon and pineapple, and it has been freely eaten and no one has been made sick by it.

"Clearly in my mind the milk does not account for the trouble. One thing further: of course the cream which you examined, has been made since the ninth day of June, and may have undergone changes which would result in generating the poison referred to in the papers [certain newspaper accounts of the finding of the poison], and which would not have been found in the cream had it been examined when fresh.

"If there is anything farther that I can furnish you in regard to these facts or circumstances in connection with this ice cream, I will be willing at any and all times to give the fullest information possible. Hoping to receive the correct analysis soon, I remain yours respectfully, "J. W. JOHNSON."

That the poison which I found in the cream was the same as that which affected the people can not be doubted after comparing the symptoms produced in the cat with those observed by Dr. Moffitt, and as has been stated, the experiment on the cat was made before I received the letter from Dr. Moffitt. The cream was made on the 9th of June, and the poison separated on the 14th.

I wrote to Mr. Johnson asking several questions, which he has kindly and fully answered. As the nature of the questions is shown in the answers, I will simply give the answers:

"(1.) The milk from all the cows was mixed together in the making of the custard."

"(2.) The custard for the lemon and vanilla was all one custard; made and mixed before the extracts were put in."

"(3.) We had previously used the same brand of extracts (Jenning's best), both lemon and vanilla, with no bad results."

"(4.) The food of the cows in the morning and evening, consists of oats and corn, ground together and fed dry, with clover and hay. I have never seen anything suspicious in the pasture or food. There is a running stream of water coming from a spring in the pasture. There is plenty of shade. At evening the cows are driven from the pasture and placed in the stable or yard, according to the season. The stable and yard are open for inspection at any time. My residence is in the center of the village, and the board of health would not allow me to stable and yard my cows there if there were any bad odors during the summer."

"(6.) The teats are thoroughly washed before each milking."

After receiving the above details concerning the making of the cream, the following experiment was made:

July 8. To one quart of night's milk a piece of the solid portion of the Lawton cream, about the size of a filbert, was added. This residue had been left in the filter paper ever since the analysis of the poisonous cream, June 14, and it was on June 8 that the first milk for the preparation of the Lawton cream was collected. This dried and hardened lump was crumbled into the milk, which was placed in a clean tin pan and set in a cool cellar. July 9, to a quart of morning's milk, another small bit of the infected material was added, and this milk was also placed in the cellar. At 1 P. M. both portions of milk were poured into a clean earthenware jar, and four fresh eggs

beaten, and one pint of granulated sugar were added. The whole was thoroughly agitated, then allowed to stand at the temperature of the room until 4 P. M., when it was placed in the ice-box of a refrigerator, surrounded by ice and here kept until 7 A. M., the next morning, July 10. Then three ounces of the custard was stirred up with distilled water, filtered, the filtrate rendered alkaline and agitated with ether. The residue on the evaporation of the ether was dissolved in a little water and given to a kitten about two months old. Immediately the kitten manifested the symptoms of poisoning by tyrotoxicon, which have already been described. I began the analysis of this custard in the morning before having my breakfast, and getting a little on my finger in carrying the jar, I tasted of it. Within a very few minutes I was nauseated, and ten minutes after I vomited. The prompt action of so small a quantity was probably due to the condition of my stomach. At 2 P. M. of the same day, I took one teaspoonful of the custard. Within thirty minutes there was marked nausea and some violent retching, but no vomiting. At 3 P. M., the symptoms having abated, I took a tablespoonful more of the custard. At about 3.30, I began to vomit freely. The nausea continued for about an hour. After this there would be passing sensations of sickness. At 8 P. M, while visiting a patient, I was taken very suddenly and sharply with nausea and griping pains in the abdomen. I again vomited and had a watery stool. After this there was no farther trouble. The occipital headache mentioned by Dr. Moffitt in his letter, was very marked for some hours after taking the custard. It consisted of sharp, lancinating pains which were confined wholly to the occiput. The nausea was peculiar. I cannot say that there was pain in the stomach. A sickening taste would be felt in the mouth and a peculiar, very sickening odor, which I recognized as that of the isolated poison, would intensify the nausea. The throat and mouth seemed filled with a sticky, tenacious mucus. In short, the effects on these parts resembled those which I have experienced from an overdose of atropia.

I think that this experiment explains the poisonous nature of the vanilla cream. The fermentation going on in the custard, and probably begun in the milk, was arrested in that part flavored with lemon by the freezing which was begun immediately. But while the lemon cream was being frozen, that part of the custard which was to be made into vanilla cream continued to ferment, and before the freezing

process was begun enough of the poison was generated to seriously affect those eating of it.

It should be remarked, that in the custard which I made there was nothing peculiar in the taste. It was sweet and pleasant. But while it was not at all acid to the taste, it gave a decidedly acid reaction as tested by litmus, and was not amphoteric in reaction, as cow's milk frequently is.

It is possible that the presence of the large amount of albumen in the custard, from the eggs, hastened fermentation. I believe that makers of cheese have found by experience that a large amount of albumen in cheese renders decomposition more easy.

How the special germ which produces the poison found its way into the Lawton cream I cannot say; but that it was either present in the milk or was contained in the eggs used, I think cannot now be doubted.

TYROTOXICON, AND CHOLERA INFANTUM.

I desire to call attention to the great similarity between symptoms of poisoning by tyrotoxicon, and those of cholera infantum. I am aware of the fact that the term "cholera infantum" is used by many in referring to almost any summer diarrhœa of children; but restricting the term to the violent choleraic diarrhœa, as is done by Smith and other best authorities on the subject, we shall find its similarity to poisoning by tyrotoxicon very marked.

The suddenness and violence of the attack, the nausea and vomiting without marked tenderness of the abdomen, the character of the stools, the great thirst, the severe pain in the back of the head, the nervous prostration, and the tendency to deep sleep, are all observed in both. Again, the white, soggy appearance of the mucous membrane of the stomach of the cat corresponds exactly with observations in children after death from cholera infantum. Cholera infantum, as is stated by Smith, "is a disease of the summer months; and, with exceptional cases, of the cities." Thus, the disease occurs at a time when decomposition of milk takes place most readily. It occurs at places where absolutely fresh milk often cannot be obtained. It is most prevalent among classes of people whose surroundings are most favorable to fermentative changes. It is most certainly fatal at an age when there is the greatest dependence upon milk as a food, and when, on account of the rapid development of intestinal follicles, there is the greatest susceptibility to the action of an irritant poison, and when

irritative and nervous fevers are most easily induced. If all these facts be taken into consideration, along with the experiments which have been detailed, and which show the readiness with which the poison can be generated, it will certainly seem at least probable to any one that tyrotoxicon may be a cause of cholera infantum. A little dried milk formed along the seam of a tin pail, or a rubber nipple, tube or nursing bottle not thoroughly cleansed, may be the means of generating, in a large quantity of milk, enough of the poison to render it highly harmful to children. The high temperature observed in children with cholera infantum, and which has not been observed in adults poisoned by tyrotoxicon, may be caused by the continued administration of milk, and by the greater susceptibility of the sympathetic nervous system in children.

If this casual relation does exist between tyrotoxicon and cholera infantum, a knowledge of it will aid us, not only in the preventive, but in the curative treatment of the disease. The first thing to do in the treatment of the disease is to absolutely prohibit the further administration of milk, either good or bad, because the fermentation going on in the intestine would simply be fed by the giving of more milk, even if that milk be of unquestionable purity. I would suggest that some meat or rice preparation be used for food, though experience will soon give us valuable information on this point.

A germ which forms a poisonous ptomaine by its growth in milk may be wholly harmless when placed in a meat or rice preparation.

Secondly, mild antacids should be administered, because the poison, so far as our information goes, is produced only in acid solutions. The great value of the chalk mixture in the treatment of the disease is well known.

Thirdly, theoretically at least, the employment of small doses of some disinfectant would be of benefit. I find that there is considerable difference of opinion in the professsion as to the use of small doses of calomel in this disease.

Fourthly, the use of opium in some form is consistent with this theory.

And lastly, the administration of stimulants, brandy and ammonia, to counteract the depressing effects of the poison already formed and absorbed, should be practiced.

All of these, save the first recommendation, have been practiced in

the treatment of the disease empirically; but the first—absolute discontinuance of the use of milk—I regard as of prime importance.

Of course, it will be understood that attention to securing fresh air, and to other hygienic measures, is also desirable.

It is altogether probable that an amount of the poison which would escape chemical detection, might be sufficient to produce poisonous effects in children.—*Report of Michigan State Board of Health.*

ANN ARBOR, July 12, 1886.

EDITORIAL DEPARTMENT.

Pharmacy in France.—A bill is pending in France modifying in several respects the laws now in existence. The important features of the new bill may be summed up as follows:—

The practice of pharmacy is restricted as heretofore to those possessing the diploma of *pharmacien* from one of the French schools of pharmacy. It is proposed to have hereafter only one form of diploma, to abolish that for pharmacist of the second class, and to remove the locality restrictions now applying to those having the latter diploma. A pharmacist is not permitted to conduct more than one store, nor to deal in articles other than such belonging to the healing art; he may take a non-pharmacist – but not a physician—as partner, but the business must be carried on solely by one legally qualified. Physicians are permitted to furnish medicines only in cases of urgency, or when located at a distance of more than five kilometers from a pharmacy, but they are not permitted to keep open shop. The labels must bear the pharmacist's name, and special labels must be provided for medicines intended for external use. The pharmacist may sell the preparations of the codex under their official names, and may furnish without the prescription of a physician simple or compound medicines, the label to give the names of the active ingredients; but certain drugs and poisons, which will be duly mentioned in the codex, must be furnished only upon the order of a qualified physician. A list of harmless drugs and preparations, the sale of which is intended to be free to all, is to be published in the codex; the sale of all others will be restricted to pharmacists. For the benefit of their own members, certain societies will be permitted to have pharmacies, each to be under the supervision of a legally qualified pharmacist; the pharmacies of hospitals may be conducted under the supervision of the medical staff. The widow or heirs of a deceased pharmacist may continue the business for one year under the management of a pharmacist. The codex is to be revised every ten years by a commission appointed by the ministers of public education and of commerce, and consisting of an equal number of professors of medical schools, professors of pharmaceutical schools, and of pharmacists engaged in business; two

veterinary surgeons are to be added to this commission. Supplements to this codex may be issued yearly if necessary. The penalties vary in different cases from 16 to 3000 francs.

The corps of military pharmacists organized in 1791 was, in 1882, placed under the control of the medical department of the army, and a bill has been prepared by the minister of war, with the view of abolishing it altogether. There are at the present time 184 military pharmacists in the service.

The University of Brussels, the semi-centennial existence of which was solemnized in November, 1884, has been destroyed by fire on the afternoon of July 7th last. The fire originated in the chemical laboratory, and made such rapid headway as to render the saving of the large library and of most of the valuable collections a matter of impossibility. Since 1842, the official title of the institution was *L'Université libre de Bruxelles.*

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Le Curare. Par Auguste Auché, pharmacien de 1re classe. 8vo, pp. 70.

Des Illicium en général; de la badaine et son huile essentielle en particulier. Par J. Tambon, pharmacien universitaire de 1re classe. 8vo, pp. 80.

De l'huile de chaulmoogra (Gynocardia odorata), de son utilité et de son emploi en thérapeutique. Par le Dr. Eugène Marçon. 8vo, pp. 59.

The last one of these three theses is from the medical school, the remaining two from the school of pharmacy at Montpellier. That on illicium and oil of staranise deserves special mention for the handsomely executed plates illustrating the anatomy of different species. We shall endeavor to give brief abstracts from these theses in another place.

Beiträge zur gerichtlichen Chemie. Von G. Dragendorff. St. Petersburg, 1886. 8vo, pp. 39.

Contributions to forensic chemistry.

The indefatigable author describes in this reprint from the Phar. Zeitschrift f. Russland, the results of researches carried on by himself and under his supervision, and embracing the following substances: Aloin and aloes; convolvulin and jalapin; chloralhydrate; phenol; myoctonine; lobelia alkaloids; thalline and antipyrine. The dissertations on three or four of the above subjects have been already noticed in this journal, and the remaining ones will be presented in a condensed form.

Massachusetts State Agricultural Experiment Station. Bulletin No. 21. June, 1886.

It contains the analyses of a number of fertilizing materials, bran, meals and ensilage made from corn and from apple pomace.

Twenty-second Annual Report of the Alumni Association, with the exercises of the sixty-fifth annual commencement of the Philadelphia College of Pharmacy, for the year 1885–1886. 8vo, pp. 204.

The report contains the transactions of the association, various addresses, &c., and a list of members; the active membership comprising 1037 names.

Formularium of Unofficinal Preparations of the Pennsylvania Pharmaceutical Association. 8vo, pp. 54. Price 35 cents, or four copies for $1.

A reprint from Pharmac. Rundschau, New York, in which journal the formulas were ordered to be printed in advance of the proceedings (see July number, page 361). The publication in pamphlet form makes the formulas accessible to all.

The Proceedings of the following State Pharmaceutical Associations at their recent meetings have been received:

Iowa. (Meetings of 1885–1886). 8vo, pp. 147. See this Journal, 1885, p. 361, and 1886, p. 359.

Kansas. 8 vo, pp. 79. See July number, p. 359. The local secretary for the next meeting is J. P. Allen, Wichita.

Massachusetts. 8 vo, pp. 232. See July number, p. 360. Chas. E. Bardwell, Holyoke, is local secretary for the next meeting.

New York. 8vo, pp. 269. See July number, p. 361. A map of the State of New York is added as frontispiece.

OBITUARY.

Giovanni Pagliari died in Florence, Italy, July 17th, 1886, at the age of 87 years. He was born in Gubbio, Province of Rome, in 1799, and was for a number of years engaged in business as a pharmacist. His name became familiar through a benzoinated solution of alum which is known as Pagliari's hemostatic.

Notice of the deaths of the following graduates of the Philadelphia College of Pharmacy has been received:

Walter H. Cline, class 1883, was accidentally killed by a railroad train near Glassboro, N. J., in July last.

John Klemet, class 1880, died July 30th, after a lingering illness, in Philadelphia. He graduated in medicine from the Jefferson Medical College in 1883.

Ross Rambo, class 1882, recently in business at 12th and Race streets, Philadelphia, died in the latter part of July.